REMARKS

Claim Rejections - 35 USC § 112

Claims 9 and 10 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement.

Claims 9 and 10 have been canceled. The 35 U.S.C. § 112, first paragraph, rejection is now moot.

Claims 1-3, 5-13, 16, 17, 19, and 20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Initially, it is noted that this rejection as it applies to claim 9 is now moot in view of the cancellation of claim 9.

Applicants again respectfully submit that the term "rugged" is definite because a person of ordinary skill in the art could readily determine the subject matter that is within the scope of the claims. Nothing more is required for definiteness under the second paragraph of 35 U.S.C. § 112.

As noted in the response filed July 3, 2008, to the first Action of April 3, 2008, the term "rugged" is used in the claims to define a characteristic of the interface between the thermoplastic resin layer and the thermosetting layer, i.e., a surface that is

rough and irregular (see, for example, The American Heritage Dictionary, Third Edition). Such a state is described at the passage from page 21, line 20 to page 22, line 16 of the specification with reference to Figs. 3 and 4.

A layered product A1 having a rugged interface 24 between a thermoplastic resin layer 22 and a thermosetting resin layer 21 is shown in Fig. 3. The rugged interface 24 including numerous filaments assures a strong bonding between the thermoplastic resin layer 22 and the thermosetting resin layer 21.

In contrast, a layered product PA having a straight interface 34 between a thermoplastic resin layer 32 and a thermosetting resin layer 31 is shown in Fig. 4. The straight interface 34 does not substantially include filaments and therefore an adhesive strength between the thermoplastic resin layer 32 and the thermosetting resin layer 31 is far lower than that of the layered product A1 of the invention.

Moreover, to the extent that the Office considers the term "rugged" to be a term of degree, the term is limited by the further limitations in claim 1 that a set of filaments among the groups of reinforcing fibers is impregnated with both of the resin of the thermosetting resin layer and the resin of the thermoplastic resin layer by passing through the interface; and that the maximum

thickness of an area where said continuous filaments exist in said thermoplastic resin layer is 10 μm or more.

Removal of the 35 U.S.C. § 112, second paragraph, rejection is respectfully requested.

Claim Rejections - 35 USC § 103

Claims 1-3, 5-7, and 8-13 are rejected under 35 U.S.C. 103(a) as obvious over Obara (JP 07-047152), machine translation included, in view of Nishimura et al. (JP 07-112039) ("Nishimura"), machine translation included.

Claims 16, 17, 19, and 20 are rejected under 35 U.S.C 103(a) as being unpatentable over Inogakura et al. (JP 09-277420) ("Inogakura") in view of Obara and further in view of Nishimura.

Applicants respectfully submit that the Office's interpretation of Obara is not correct for the reasons explained below. Therefore, the proposed modification of Obara according to the teachings of Nishimura will not result in the layered product of the present invention.

For understanding the difference between the layered product defined in claim 1 of the present application (the layered product of the invention) and the layered product disclosed in Fig. 3 or 4 of Obara (the layered product of Obara), it is helpful to consider a method for producing the layered product of Obara.

A method for producing the layered product of Obara is described in paragraphs [0023], [0024], and [0025] of Obara as Example 3. Full English translations of paragraphs [0023], [0024], and [0025] of Obara are attached hereto.

Obara discloses another method for producing the layered product in paragraph [0027], Examples 4 and 5. However this method is substantially the same as the method described in Example 3, except that carbon fibers exist additionally in a domain in which the thermosetting resin and the thermoplastic resin are intermingled with each other.

In Example 3 of Obara, a preform comprising (a) a carbon fiber reinforced epoxy resin (thermosetting resin) prepreg, (b) a nonwoven fabric of a maleic acid modified polypropylene resin (thermoplastic resin) which is placed on the prepreg and (c) a sheet composed of a carbon fiber aggregate impregnated with a maleic acid modified polypropylene resin (thermoplastic resin) which is placed on the nonwoven fabric, is prepared. The preform prepared is set in a racket frame metal mold.

In the mold, the preform is heated at 200°C for 20 minutes and after that the preform is heated at 130°C for 30 minutes to produce a racket frame.

It is explained in Obara that the epoxy resin (matrix resin) of the carbon fiber reinforced epoxy resin prepreg shows the minimum viscosity at about 120°C, i.e., the epoxy resin cures at about 120°C and becomes unflowable (solid state). The epoxy resin is flowable at a temperature up to about 120°C, during a temperature rising process to 200°C. The epoxy resin which is flowable impregnates into spaces of a network structure which is formed with fibers in the nonwoven fabric, however the epoxy resin does not reach the fiber reinforced thermoplastic resin sheet through the spaces and stops in the spaces in the nonwoven fabric, since the minimum viscosity of the epoxy resin is high. In this stage, the fibers forming the network structure are not melted and maintain the network structure.

While the temperature in the mold rises from about 120°C to 200°C, the fibers forming the network structure and the matrix resin of the fiber reinforced thermoplastic resin sheet are melted and unified with each other at about 160°C. In this stage, the formation of the nonwoven fabric is lost. The epoxy resin which has entered into and has been solidified in the original spaces in the original nonwoven fabric is surrounded with a molten thermoplastic resin constituted of the original nonwoven fabric.

As a result, after solidifying the thermoplastic resin, a domain in which the thermosetting resin and the thermoplastic resin are intermingled with each other in three dimensions and which resulted from the network structure is formed at the boundary of the fiber reinforced thermosetting resin and the fiber reinforced thermoplastic resin.

Further Obara discloses Comparative Example 2 as a comparison with Example 3 at paragraph [0026]. A full English translation of the paragraph is attached herewith.

The method for producing a layered product in Comparative Example 2 is the same as that of Example 3 except that the nonwoven fabric is not used. As a result, the fiber reinforced thermosetting resin and the fiber reinforced thermoplastic resin are unified with each other with a clear interface and a domain having intermingling of the thermosetting resin and the thermoplastic resin does not appear at the interface.

From Comparative Example 2 of Obara, it can be understood that an object of Obara is to improve bonding strength between the thermosetting resin and the thermoplastic resin which are joined with a clear interface, i.e., a straight interface. The object of Obara is substantially same as the object of the present invention which is explained in the passage at page 22, lines 4-16 of the

present specification.

To achieve the object, Obara chooses forming a domain in which the thermosetting resin and the thermoplastic resin are intermingled with each other with the formation of a network structure at the interface.

In contrast, to achieve the same object, the present invention chooses another way that is different from the way selected by Obara. To achieve the object, the present invention chooses a way to form a domain in which the thermosetting resin and the thermoplastic resin form a two-layer structure in such a manner that the thermosetting resin and the thermosetting resin define a rugged interface.

The basic technical concept of Obara, in the method for producing the layered product, is that a flowable thermoplastic resin is unified with an unflowable thermosetting resin which forms a network structure in three dimensions.

In contrast, the basic technical concept of the present invention, in the method for producing the layered product, is that a flowable thermoplastic resin is unified with a flowable thermosetting resin. This basic technical concept is described, for example, in the passage from page 8, line 24, to page 9, line 6, at page 16, lines 9-17 or from page 45, line 12, to page 46,

line 22. As a result, a rugged interface is formed between the thermosetting resin layer and the thermoplastic resin layer as described in the passage, for example, at page 16, lines 18-26 or at page 46, lines 12-19.

An interface between a thermosetting resin layer and a thermoplastic resin layer which are integrated at the interface between these layers forming a two-layer structure in such a manner that the thermosetting resin layer and the thermoplastic resin layer define a rugged interface cannot be formed by the basic technical concept of Obara, since the thermosetting resin is solidified and is not flowable at the time of unifying the thermosetting resin and the molten thermoplastic resin.

In contrast, an interface between a thermosetting resin and a thermoplastic resin which are integrated at the interface between these resins forming an intermingled structure is not formed by the basic technical concept of the present invention, since the thermosetting resin and the thermoplastic resin are flowable with each other at the time of unifying the thermosetting resin and the thermoplastic resin.

For the above reasons, the layered product of the present invention and that of Obara are structurally distinct. Therefore, the proposed modification of Obara to make the thermoplastic layer

of Obara approximately 10 μm or more will not result in the layered product of the present invention.

The integrated molded object of claims 16, 17, 19, and 20 includes the layered product of claim 1 of the present application. Since the product of Obara as modified by Nishimura is not the layered product of claim 1, the proposed modification of the object of Inogakura to include the product of Obara as modified by Nishimura will not result in the integrated molded object of claims 16, 17, 19, and 20.

Removal of the 35 U.S.C. § 103(a) grounds of rejection is in order and is respectfully solicited.

The foregoing is believed to be a complete and proper response to the Office Action dated September 16, 2008, and is believed to place this application in condition for allowance. If, however, minor issues remain that can be resolved by means of a telephone interview, the Examiner is respectfully requested to contact the undersigned attorney at the telephone number indicated below.

In the event that this paper is not considered to be timely filed, applicants hereby petition for an appropriate extension of time. The fee for any such extension may be charged to our Deposit Account No. 111833.

In the event any additional fees are required, please also

charge our Deposit Account No. 111833.

Respectfully submitted,
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